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Description

ONE-PIECE SOFT SPOUT VALVE ASSEMBLY FOR A NO-SPILL DRINKING CUP

Cross Reference To Related Applications

[0001] This application claims the benefit of U.S. Provisional Application No. 60/547,326, filed February 24, 2004, entitled "One-piece Soft Spout Valve Assembly For A No-spill Drinking Cup."

Background of Invention

[0002] The present invention relates generally to drink containers, and more particularly, to valve assemblies for no-spill drink containers.

[0003] Current no-spill valves suffer from a variety of disadvantages. Some current no-spill valves are constructed of multiple pieces that are relatively difficult to clean. Moreover, some of these no-spill valves have both an inlet valve and an outlet valve and thus require even more

parts, which increases both the material and manufacturing costs associated with the valves. In an effort to reduce costs, one-piece valves constructed of a silicon material have been developed. However, some of these one-piece valves include a perforation formed in the valve that allows fluid to flow into and out of the drinking cup. These perforations, however, are prone to leakage, particularly if the drinking cup into which the valve is incorporated is tipped over. This is because there is no structure for sealing off the perforation as the valve operates by the opening and closing of the perforation itself.

[0004] Improvements over these valves have included a single piece solid valve that is releasably engageable with the lid of a drinking cup. In this configuration, the valve is located beneath or in communication with a spout, typically constructed of a plastic, in a drinking lid. The valve can be constructed entirely of silicon or may alternatively be a silicon diaphragm disposed within a plastic housing.

[0005] Therefore, a need exists for a one-piece assembly having a valve that seals the drinking spout, a valve that is integrally constructed with the spout allowing fluid to flow directly through the valve and spout, and a valve that virtually eliminates leakage through the valve and the lid. Also,

there is a need for such a closure that includes an additional valve to allow fluid pressure to be released.

Summary of Invention

[0006] It is therefore an advantage of the present invention to provide a one-piece spout and valve assembly for a drinking cup.

[0007] It is a further advantage of the present invention to provide an integral valve and valve seat that allows fluid to flow directly through the valve and spout from the drinking cup.

[0008] It is another advantage of the present invention to provide a no-spill valve that virtually eliminates any leakage through the valve and the lid.

[0009] It is still a further advantage of the present invention to provide a no-spill valve that allows fluid to pass at one location and allows pressure to be released at another location.

[0010] It is yet another advantage of the present invention to provide a no-spill valve and spout assembly that utilizes minimal parts and thus makes cleaning relatively simple.

[0011] In accordance with the above and the other advantages of a first embodiment of the present invention, a one-piece spill proof valve and spout assembly for a drinking cup lid

is provided. The valve and spout assembly is preferably constructed of a flexible material, such as silicone. The valve and spout assembly has a raised spout that allows fluid to flow therethrough. The spout has a valve integrally formed therewith and beneath the spout opening. The valve is moveable between an open position allowing fluid to pass through the raised spout and a closed position blocking the flow of fluid therethrough. The valve and spout assembly includes a circumferential rim that is intended to engage a lid portion to effectuate securing the valve and spout assembly to a drinking cup. The valve is moveable between the open and closed position upon application of a slight force by the user.

[0012] In another embodiment of the present invention, a one-piece soft spout valve assembly for a drinking cup is provided as a diaphragm. The diaphragm has a body, a spout portion and a valve portion integrally formed in the body. The body has an outward surface, an inward surface, and a peripheral edge. The peripheral edge delineates the outward surface from the inward surface. The spout portion and the valve portion form a cavity within the inward surface of the body and a drinking opening within the spout portion on the outward surface of the body, whereby fluid

may pass from the cavity to the drinking opening through the valve portion when the valve portion is forcibly actuated by the spout portion in response to an externally applied force by an user.

[0013] Other advantages of the present invention will become apparent when viewed in light of the detailed description of the preferred embodiment when taken in conjunction with the attached drawings and appended claims.

Brief Description of Drawings

[0014] FIGURE 1 is a cross-sectional view of an integral valve and spout assembly attached to a drinking cup according to one embodiment of the present invention.

[0015] FIGURE 2 is a cross-sectional view of an integral valve and spout assembly attached to a drinking cup according to another embodiment of the present invention.

[0016] FIGURE 3 is a partial cross-sectional view of an integral valve and spout assembly attached to a drinking cup opening according to another embodiment of the present invention.

[0017] FIGURE 4 is a cross-sectional view of an integral valve and spout assembly according to another embodiment of the present invention.

[0018] FIGURE 5 is a top view of an integral valve and spout as-

sembly according to yet another embodiment of the present invention.

[0019] FIGURE 6 is a top view of an integral valve and spout assembly according to another embodiment of the present invention.

[0020] FIGURE 7 is a partial cross-sectional view of a valve and spout portion of a diaphragm according to another embodiment of the present invention.

[0021] FIGURE 8 is a partial cross-sectional view of a vent portion of a diaphragm according to yet another embodiment of the present invention.

[0022] FIGURE 9 is a partial cross-sectional view of a valve portion of a diaphragm according to another embodiment of the present invention.

[0023] FIGURE 10 is a top view of an integral valve and spout assembly according to yet another embodiment of the present invention.

[0024] FIGURE 11 is a front cross-sectional view of an integral valve and spout assembly according the embodiment of Figure 10.

[0025] FIGURE 12 is a side cross-sectional view of an integral valve and spout assembly according to the embodiment of Figure 10.

DETAILED DESCRIPTION

[0026] In the following figures, the same reference numerals are used to identify the same components in the various views and alternate embodiments.

[0027] Referring now to FIGURE 1, there is generally illustrated a cross-sectional view of an integral valve and spout assembly 10 attached to a drinking cup 12 according to one embodiment of the present invention. In this embodiment, the valve and spout assembly 10 is attached to a lid portion 14, which engages the drinking cup 12 by threads 15. Alternatively, as would be recognized by one of ordinary skill in the art, the valve and spout assembly 10 can be directly attached to the drinking cup without the need for a lid portion. Also one of ordinary skill in the art would recognize that lid portion may also be attached to the drinking cup in a variety of other suitable ways.

[0028] The valve and spout assembly 10 preferably is comprised of a flexible material, such as silicone. Alternatively, a variety of other suitable materials may be utilized as would be recognized by one of ordinary skill in the art.

[0029] The drinking cup 12 and the lid portion 14 are both preferably constructed of a plastic material. It will be understood by a person having ordinary skill in the art that a

variety of other suitable materials may be utilized. Moreover, the material may be selected depending upon whether the valve and spout assembly 10 is directly attached to the drinking cup 12 or to the lid portion 14.

[0030] FIGURE 2 is a cross-sectional view of an integral valve and spout assembly 10 attached to a drinking cup 12 according to another embodiment of the present invention. In this embodiment, the valve and spout assembly 10 is attached in sealing compression between a lid portion 14 and a drinking cup 12, in which the lid portion 14 engages the drinking cup 12 by threads 15. Alternatively, as would be recognized by one of ordinary skill in the art, the valve and spout assembly 10 need not be directly attached to the lid portion 14 (as shown) when the valve and spout assembly 10 is retained compressively. Also one of ordinary skill in the art would recognize that the lid portion may be attached to the drinking cup in various other ways.

[0031] FIGURE 3 is a partial cross-sectional view of an integral valve and spout assembly 10 attached to a drinking cup opening 12 according to another embodiment of the present invention. The valve and spout assembly 10 includes a peripheral edge 16, which is generally circular in

shape when viewed from the top. The peripheral edge 16 in this embodiment includes a groove 18 formed therein to allow the valve and spout assembly 10 to engage a rim 19 of the drinking cup 12. The engagement of the rim 19 into the groove 18 is preferably accomplished by a tight friction fit. Alternatively, other suitable engagements can be effectuated between the valve and spout assembly 10 and the rim 19 of a cup 12 or a lid 14 as would be recognized by a person having ordinary skill in the art.

[0032] The valve and spout assembly 10 includes a raised spout portion 20 through which a person can drink fluid from the cup 12. The raised spout portion 20 includes a drinking opening 21 and an integral valve portion 22, which is moveable between a normally closed portion and an open position. The integral valve portion 22 of this embodiment is a duck valve.

[0033] Alternatively, the valve and spout assembly 10 may also include a vent portion 24 (as shown in FIGURE 1) for releasing pressure that builds up in the cup 12. It will be understood by one having ordinary skill in the art that the vent portion 24 may be configured to relieve pressure, build up pressure or to let pressure in and out of the cup 12. It will be understood that the valve and spout assem-

bly 10 can also be formed without the vent portion 24.

[0034] The valve portion 22 is preferably comprised of a pair of opposing flap portions 26, 28 that are normally closed to prevent the flow of fluid. To open the valve portion 22, a user places their mouth over the spout portion 20 and applies a slight force or squeeze to the sides of the spout portion 20 (in the notional direction of the externally applied force F as shown in FIGURES 5 and 6). Obviously, the external force may be applied to the spout portion 20 in a variety of different ways. The external force will cause the flap portions 26, 28 of the valve portion 22 to pucker outwardly (as shown in FIGURE 7) forming an opening between the flap portions 26, 28 that will allow fluid to pass in either direction from the valve portion 22 and through the drinking opening 21. Once the force is removed from the valve portion 20, the flap portions 26, 28 will return to a normally closed position. The vent portion 24 preferably has the same configuration as the valve portion 22.

[0035] In the current embodiment, the valve portion 22 has a pyramidal shape and the spout portion 20 has a cylindrical shape when both are in their normally closed position. One having ordinary skill in the art will recognize that a variety of other shapes may be used to configure the valve

and spout assembly.

[0036] FIGURE 4 is a cross-sectional view of an integral valve and spout assembly 10 according to another embodiment of the present invention. In this embodiment of the invention, the valve and spout assembly 10 is shown as a diaphragm 11 having a body 17, a spout portion 20 integrally formed in the body 17, and a valve portion 22 integrally formed in the body 17. The valve portion 22 is also preferably integrally formed within the spout portion 20. The body 17 has an outer surface 30, an inner surface 32, and a peripheral edge 16 delineating the outer surface 30 from the inner surface 32.

[0037] The spout portion 20 and the valve portion 22 form a cavity 23 within the inner surface 32. The spout portion 20 and the valve portion 22 form a drinking opening 21 within the outer surface 30 of the spout portion 20. Fluid may pass from the cavity 23 to the drinking opening 21 through the valve portion 22 when the spout portion 20, in response to an externally applied force, forcibly actuates the valve portion 22 to an open position.

[0038] In the preferred embodiment the diaphragm 11 is made from a flexible material such as silicone or latex. One of ordinary skill in the art would recognize that other materi-

als may also be used.

[0039] The diaphragm 11 has a pair of web portions 36, 38 integrally connecting the spout portion 20 to the valve portion 22. One having ordinary skill in the art would recognize that any number of web portions may be used. Alternatively, it will be understood by one of ordinary skill in the art that the spout portion 20 and the valve portion 22 need not be coupled by web portion, but may be integrally coupled, closely coupled, or even have a space gap separating them as shown in the other embodiments of the invention. The pair of web portions 36, 38 facilitate forcibly actuating the valve portion 22 when an externally applied force is exerted upon the spout portion 20.

[0040] The valve portion 22 of this embodiment is comprised of a pair of opposing flap portions 26, 28. Each flap portion has two outer axial edges 40, 41, 42, 43. The pair of flap portions 26, 28 are adjoined along opposite adjacent outer axial edges. That is, outer axial edges 40, 43 are adjoined and outer axial edges 41, 42 are adjoined. The pair of flap portions 26, 28 of the valve portion 22 are normally in a closed configuration.

[0041] The spout portion 20 of the current embodiment is elliptical. Also, the valve portion 22 is elliptical. Alternatively, it

will be recognized by a person having ordinary skill in the art that the spout portion 20 and the valve portion 22 may have different geometries.

[0042] Optionally, as shown in the current embodiment, the diaphragm 11 may include an integrally constructed vent portion 24. The vent portion 24 relieves pressure by venting pressure when gasses build up or releasing a vacuum when the internal atmosphere is depleted within the cup. The vent portion 24 is constructed in the same manner as the valve portion 22. Alternatively, one having ordinary skill in the art will recognize that the vent portion 24 may have the same structure as the valve portion 22 disclosed in the other embodiments.

[0043] The peripheral edge 16 of this embodiment has a groove 18 circumferentially formed therein. The groove 18 is primarily circular and delineates an upper edge 46 and a lower edge 48 on the peripheral edge 16, whereby the groove 16 may engage a drinking cup or a lid. Alternatively, one having ordinary skill in the art will recognize that that the upper edge 46 and the lower edge 48 need not be circular, but may be any shape that sufficiently retains the groove 18 of the diaphragm 11 in sealing contact with a cup or lid. Moreover, the peripheral edge 16

does not necessitate an upper edge 46 (see FIGURE 5) when used with a cup and lid combination, such as the combination shown in FIGURE 2.

[0044] FIGURE 5 is a top view of an integral valve and spout assembly 10 according to yet another embodiment of the present invention. In this embodiment of the invention, the diaphragm 11 of the valve and spout assembly 10 is shown with a mouth shaped spout portion 20 having a closely coupled valve portion 22 integrally assembled therein. In order to actuate the valve portion 22, an external force F must depress the spout portion 20 and bring it in squeezing contact with the valve portion 22 whereby the flap portions 26, 28 are forcibly separated.

[0045] The vent portion 24 of this embodiment is configured to relieve pressure when a vacuum is formed within the inward surface 32.

[0046] Moreover, the peripheral edge 16 has a lower edge 48 for retaining the diaphragm 11 in a clamping fashion when used with a cup and lid combination.

[0047] FIGURE 6 is a top view of an integral valve and spout assembly 10 according to another embodiment of the present invention. In this embodiment of the invention, the diaphragm 11 of the valve and spout assembly 10 is

shown with a cylindrical shaped spout portion 20 connectively coupled to a nozzle shaped valve portion 22 by web portions 36, 37, 38, 39. The valve portion 22 is opened when an external force F is applied to the spout portion 20 squeezing contact with the web portions 36, 38. The actuation of the valve portion 22 is also enhanced by the web portions 37, 39 in pulling contact with the flap portions 26, 28 by the forcibly elongated shape of the spout portion 20 caused by the external force F.

[0048] The vent portion 24 of this embodiment is configured to relieve pressure when a pressure buildup is formed within the inward surface 32.

[0049] The peripheral edge 16 with the internally formed groove 18 has a lower edge 48 and a smaller upper edge 46 for retaining the diaphragm 11 in a clamping fashion when used with a cup or a cup and lid combination. Alternatively, one of ordinary skill in the art will recognize that the upper edge 46 need not be smaller than the lower edge 48, but may be the same size or larger depending upon the application to which valve and spout assembly 10 are used.

[0050] FIGURE 7 is a partial cross-sectional view of a diaphragm 11 according to another embodiment of the present in-

vention. In this embodiment of the invention, the valve portion 22 is shown in an actuated configuration where an external force (not shown) is applied to the spout portion 20. In this configuration, gas and fluid may pass in either direction from the cavity 23 through the flap portions 26, 28 of the valve portion 22 to the drinking opening 21.

[0051] Also, as shown in this embodiment, the outer axial edge 40 of the flap portion 26 is adjoined to the outer axial edge 43 of the flap portion 28.

[0052] FIGURE 8 is a partial cross-sectional view of a vent portion 24 of a diaphragm 11 according to another embodiment of the present invention. In this embodiment of the invention, the vent portion 24 of the diaphragm 11 has flap portions 27, 29 and is configured to relieve vacuum conditions. Alternatively, one of ordinary skill in the art will recognize that the vent portion 24 could be configured to vent pressure conditions and or relieve vacuum conditions.

[0053] FIGURE 9 is a partial cross-sectional view of a diaphragm 11 according to another embodiment of the present invention. In this embodiment of the invention, a valve portion 22 of the valve and spout assembly 10 has a flap portion 28 with outer axial edges 42, 43. The valve por-

tion 22 is connected to the spout portion 20 by the webs 36, 38. Alternatively, a person having ordinary skill in the art will recognize that the webs 36, 38 may fully or partially contact the valve portion 22 to the spout portion 20.

[0054] Figures 10, 11, and 12 show top, front, and side views, respectively, of an integral valve and spout assembly 10 according to yet another embodiment of the present invention. In this embodiment of the invention, a diaphragm 11 has a body 17, a vent portion 24 integrally formed in the body 17, and an elliptical spout portion 20 integrally formed in the body 17. Also, a pyramidal valve portion 22 is integrally formed within the spout portion 20 of the body 17. The valve portion 22 is axially connected to the spout portion 22 by four web portions 36, 37, 38, 39.

[0055] The valve portion 22 has a pair of opposing flap portions 26, 28. Each flap portion 26, 28 has two outer axial edges (not shown). The flap portions 26, 28 are adjoined along opposite adjacent outer axial edges (not shown). The flap portions 26, 28 are normally releasably closed.

[0056] The body 17 has an outward surface 30, an inward surface 32, and a peripheral edge 16 delineating the outward surface 30 from the inward surface 32. A groove 18, for engaging a drinking cup or a lid, is circumferentially formed

in the peripheral edge 16.

[0057] The spout portion 20 outwardly extends from the outward surface 30. The outwardly extending spout portion 20 forms a cavity 23 within the inward surface 32. A drinking opening 21 is also formed on the outward surface 17 of the spout portion 20. Fluid may pass from the cavity 23 to the drinking opening 21 through the valve portion 22 when the valve portion 22 is forcibly actuated by the web portions 36, 37, 38, 39 and the spout portion 20 in response to an externally applied force.

[0058] While particular embodiments of the invention have been shown and described, numerous variations and alternate embodiments will occur to those skilled in the art. Accordingly, it is intended that the invention be limited only in terms of the appended claims.